

Claims

1. A clip for closing a puncture hole in a blood vessel, the clip comprising a ring having a resiliently expandable circumference and a plurality of barbed prongs extending at least approximately in the same direction from one edge of the ring.
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2. A clip as claimed in claim 1, wherein the prongs converge slightly towards the centre of the ring.
- 10 3. A clip as claimed in claim 1 or 2, wherein the ring is sinuous.
4. A clip as claimed in claim 1 or 2, wherein the ring comprises a plurality of elongated segments each with a longitudinal centre slit, the segments being disposed side by side around the ring with their longitudinal axes substantially parallel and being joined
15 each to the next by a relatively narrow waist.
5. A device for closing a puncture hole in a blood vessel using a clip of the kind claimed in any preceding claim, the apparatus comprising an elongated body having a front end for insertion through the hole into the blood vessel and a clip expander
20 positioned on the body rearwardly of the front end for receiving the clip with its ring surrounding the expander and its prongs projecting towards the front end of the body, the clip expander being actuable to resiliently expand the circumference of the ring, the clip being movable forwardly in its expanded state so that the prongs pierce the tissue around the hole, and the clip expander thereafter being actuable to release the clip so that the
25 body and clip expander can be withdrawn from the ring.
6. An apparatus as claimed in claim 5, wherein the clip expander comprises an inflatable enclosure surrounding the body, the enclosure being actuable to expand the ring by introducing fluid under pressure into the enclosure and being actuable to release
30 the clip by venting the fluid.

7. An apparatus as claimed in claim 6, wherein the fluid is introduced into the enclosure via a longitudinal bore in the body.
8. An apparatus as claimed in claim 6 or 7, wherein when inflated the enclosure has a shoulder behind the ring, the shoulder enabling the clip to be pushed forwardly into the tissue around the hole by forward movement of the body.
9. An apparatus as claimed in claim 5, wherein the clip expander comprises a sleeve surrounding the body which has one end fixed relative to the body, a section of the sleeve intermediate its ends being slit longitudinally to form a plurality of splines which can be forced mutually outwardly by sliding the other end of the sleeve along the body towards the fixed end of the sleeve, the clip being mounted on the splined section of the sleeve.
10. An apparatus as claimed in claim 9, wherein the splines are hinged such that as the splines move mutually outwardly to expand the ring they also advance the clip towards the forward end of the body.
11. An apparatus as claimed in claim 10, wherein after advancing the clip further movement of the said other end of the sleeve towards the fixed end moves the splines mutually inwardly to release the clip.
12. An apparatus as claimed in any preceding claim, wherein the body has a longitudinal bore to slidably accommodate a guide wire pre-positioned at the puncture hole.
13. An apparatus as claimed in any preceding claim, wherein the body has a longitudinal bore to serve as a blood return channel.